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OF ALPHABET-NUMBER TEXT

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## TIME DEPENDENCE OF VISUAL PERCEPTION ON DIMENSIONS OF ALPHABET-NUMBER TEXT

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Visual perception is a complex process, including elements /85\* of attention, short-term memory, thought, motor functions of the visual apparatus, etc. Man receives up to 80% of all /86 information through the visual analyzer [1]. The ease of perception of alphabet-number information by an operator permits acceleration of decision making, decrease in fatigue and reduction in the probability of error. Therefore, the effect of the optimum dimensions of a symbol, the optimum type, contrast and the relation of the symbol and background colors are of great importance in the design of instruments, control panels and devices linking man with a complex technical system.

The results of the initial stage of research, consisting of determination of the time dependence of visual perception on type dimensions are set forth in this report [2].

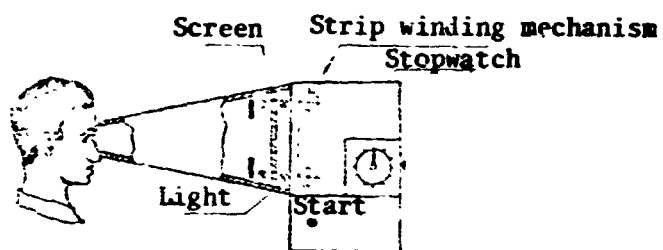


Fig. 1.

of the instrument, between the eye of the subject and the strip. Four illuminating lights are located in front of and behind the screen. A layer of metal, sputtered onto one side of the

A special instrument was prepared for conduct of the experiments, which permits measurement of the time of perception of letters and numbers, applied to a paper strip (Fig. 1). A glass partition (screen) is installed in the tube

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\*Numbers in the margin indicate pagination in the foreign text.

screen, permits the subject to examine the symbols applied to the strip only when it is illuminated by the rear group of lights; the lights in front of the screen are on all the time, which eliminates the necessity of visual adaptation with each measurement. When the "start" button is pressed, the lights behind the screen are turned on and illuminate the strip for a period of 5 seconds. At this moment, the subject begins reading the text presented and perception time is counted. The button is released upon completing the reading. The perception time is determined by the time the "start" button is in the on state, and it is recorded by a type PV-53L electric stopwatch, included in the instrument set. The lights behind the screen are switched off by a time relay. After termination of the illumination, advancing the strip to a new position and resetting the stopwatch is carried out automatically.

For purposes of decreasing the effect of memory, elements /87 of thought and the like, the following requirements were followed in compilation of the tests:

The amount of information presented simultaneously should not exceed the short-term memory volume, i.e., 6-8 symbols [3];

The tests should not have a sense content, to avoid acceleration of perception time, owing to possible guesses;

The test should be situated in a small visual angle, so as to not add the time necessary for movement of the eyeball to the perception time;

Considering that the control of perception time is accomplished by the reading of a group of symbols by the subject, they must be so grouped that the pronunciation time in each trial is identical.

The visual information used in the experiments were tests of 16 sizes of seven letters per group. To obtain the averaged values of the perception time, each symbol group size was repeated five times. The symbols in the tests were in drafting characters, according to All-Union State Standard 3454-59. Three tests used in the experiment are presented in Fig. 2 as examples.

ЛЕМЕНОТ РОТОСОР АВРОКАМ  
КАЗАНОН МОНУЛЕС КИВОТАН  
СОНОКАЛ ТИНОМЕТ РЕДАКОН  
ТИЛИПУМ РОКЕЦИН ТАНОМЕТ  
ВИТОРИК РИМЕНАЛ МИНУЛОВ

Fig. 2.

Curves of perception time vs. dimensions of the symbols presented were plotted from the experimental data obtained on four subjects; the logarithm of the perception time was laid out on the abscissa and the logarithms of the areas bounding the symbol outlines on the ordinate (Fig. 3).

It is easy to see that these curves are analogous to intensity-duration curves, describing threshold current vs. duration of a single impulse in excitation of nerves and muscles [4]. (With the largest size characters, in distinction from other points, a lengthening of the perception time was observed; this can be explained by the incorporation of unanticipated

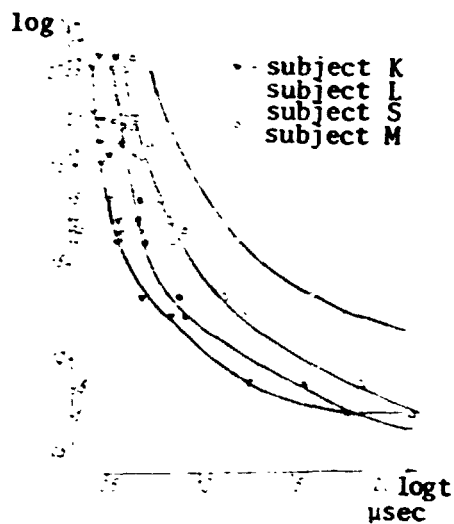


Fig. 3.

describing the operating conditions in the man-screen system. The methods of analysis of intensity-duration curves, describing the threshold stimulation conditions of nerves and muscles can be applied to them [5].

conditions of this experiment of eyeball movement.) The minimum symbol sizes distinguished in a long time on the curves are rheobase analogs. The shift of the curves along the horizontal axis apparently is determined by the psychophysiological data of the subjects and, along the vertical axis, by their visual acuity. The curves obtained can be considered as relationships

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